

Chapter 11

Carpooling Solutions Using Machine Learning Tools

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ABSTRACT

Many people in the world face travel issues in their daily lives, such as traffic congestion, lack of parking spaces, fuel, waste, and pollution. For example, if there are not enough parking spaces on a university campus, it will take a significant amount of time for the students as well as faculty to find parking. In addition, if parking is available outside, employees will have to travel a long distance to enter the building, which will require additional time. Each day, many people in the world must travel a considerable distance to get to their destination. The purpose of this chapter is to resolve the travel issue by proposing a carpool solution using machine learning techniques.

INTRODUCTION

India boasts the world's second-largest geographical area and the world's second-largest road network. By 2020, the country's road network will have covered about 5.89 million kilometers. Moreover, 90 per cent of India's total passenger traffic of India utilizes the road network for communication (Samanta et al., 2021; Anand et al., 2022) and transportation. At the same time, the world's vehicle population is more than 0.66 kilometers per square kilometer.

Carpooling (Ma et al., 2021) is when a group of people wish to use their automobile to go from one home to another, not only to save money but also to preserve the environment from pollution by using less gasoline and also to provide them joy

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while traveling. The carpooling services supplied via the website will operate as a barrier between various unknown persons who wish to travel in a shared manner and will only need calculating tips when collective displacements from their source to each other's destination are required. Carpooling is a socially acceptable and environmentally beneficial method of sharing travel. It aids in reducing carbon dioxide (CO₂) emissions, reducing traffic congestion, and resolving different parking space concerns, allowing us to promote carpooling during times of rising fuel costs and high pollution levels. Because of the fast expansion in transportation, providing common transportation services has become more difficult. Carpooling also helps to save transportation costs such as gasoline, maintenance, toll fees, and the hardship of driving by allowing ordinary people to use one vehicle for communication.

LITERATURE REVIEW

The Internet of Things (IoT) uses various devices capable of talking and exchanging information since this concept allows them to be used in both active and passive configurations. The essential goal of IoT (Liu et al., 2021) is to create clever, intelligent settings or places where objects such as smart cities (Kaushik et al., 2021), smart homes, and smart transportation (Stiles, J. et al., 2021) are self-aware for unique and inventive applications. On the IoT, each item and entity (thing) is given a unique identification to receive or send data mechanically from or to a network. Radio-Frequency Identification (RFID) (Shaohao, X., et al. 2020) sensors (Wei et al., 2021), actuators (Zenkour et al., 2021), detectors (Gonzo, 2021), and other IoT gadgets are examples. Much of the IoT consists of various intelligent computer devices and associated sensor systems that are primarily utilized in vehicle-to-vehicle (V2V) and machine-to-machine (M2M) communication, as well as wearable computing devices for various reasons. The IoT is steadily expanding its application sector in several technology domains, securing its position in transportation and traffic management. The main issue in the present situation is the rise in the number of passenger vehicles (i.e. automobiles), which is directly proportional to population growth.

Consequently, substantial issues such as extreme traffic congestion (Moyano et al., 2021), accidents, noise, and travel time lag have arisen. Car sharing is an improved means of transportation that allows numerous people to share a single car trip, regardless of their origin. The main goal is to minimize the overall number of vehicles on the road at any time while lowering the travel cost for each rider. Car sharing is, in reality, the most frequent general para transit method, in which passengers from various user groups share a vehicle that follows their pre-determined itinerary. In addition, car sharing facilitates ridesharing using passenger automobiles,

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